Energy and Environmental Policy
Fall 2015 PA5721
Monday & Wednesday 4:00-5:15
Blegen 140

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Class Moodle: https://moodle.umn.edu/course/view.php?id=21355

Class Facebook Site: Energy and Environmental Policy:
https://www.facebook.com/EnergyandEnvironmentalPolicy

Kate Connors: kconnors@umn.edu
Sample Videos: https://www.lib.umn.edu/media/profiles/energypolicyvideo

In this class we will explore energy, technology, environmental issues and the evolving political context and response. We will examine the interplay between technological systems and social systems, trying to better understand how technology has played a key role in both creating and mediating environmental impacts. We will use a diverse set of tools and methodologies to examine energy/environmental systems from many different angles and understand how energy systems work, explore the larger impacts of the energy system and examine implications of technology and policy choice. This will allow us to better evaluate the environmental and social implications of different energy options. By understanding how these issues interact at the local, state, regional, national and international levels we hope that class will be able to understand the global and local forces shaping energy-environment systems.

By its very nature, this study will be interdisciplinary and multi-scalar. Lectures and discussions will focus on methods from engineering, political science, physics, sociology and economics. This course will cover local energy use and impacts, national policies and the global trends that shape the energy system. We will examine energy use in history, study the present day energy/environmental systems and explore the challenges of deploying emerging energy technologies.
Course Structure and Goals

This class will be taught using active learning techniques and is roughly broken into four parts. Part 1 will help to build a set of basic tools (policy analysis, economic cost calculations, and introduce ‘back of envelope’ calculations) and familiarize you with the system underpinnings (energy units, infrastructure) to explore energy and environmental issues. Part 2 will examine the issue of climate change, and Part 3 Transportation. Part 4 electricity sector and part 5 covers cross-cutting issues like energy and development, energy use in developing nations, and energy poverty. Each part will cover energy production, use, and policy, associated environmental impacts, and incorporate history, technology, regulation and geopolitical considerations as well as cross-cutting issues.

By the end of this semester we hope that you will be able to:

- Understand and use basic energy units and conversion factors and be able to perform basic “back of the envelope” calculations on energy and environmental technologies.
- Understand opportunities and challenges of existing energy infrastructure and emerging technologies.
- Understand the existing regulatory environment and the role of public policy in shaping energy and environmental planning.
- Be able to become a discerning participant/observer within the energy and environmental debate, examining the literature, institutions, and technologies with a critical and informed eye.
- Be familiar with different communication methods: academic paper, policy brief, and video project to address a critical energy issue.

Good to have texts


Apart from this, the required readings in this class will be available online using Moodle. Please ensure that you are able to view them and contact Mary Maronde (email: maron008@umn.edu), if you need any help with Moodle

Grading:

10% -- Daily questions
10% -- Hot topic presentation
30%-- Three problem-sets containing both qualitative and quantitative elements (10% each)
40% Final Group Presentation, including video and policy-brief (15% presentation, 15% video project, 10% policy brief)
10% Participation class discussion, back of envelope, and Facebook postings

Daily Questions: For each of the assigned readings prepare at least one question or comment. These daily questions or comments should be 3-5 sentences in length, and should be posted on the Moodle by noon the day before each class when daily questions are due,
so we can address them in lecture the following day. Note that the questions can only be read by the course instructors, and there are no questions due the days we have guest speakers. Questions will be scored 1=poor (your question required very little reflection on the reading); 2=good (it’s evident that you read the paper, but you only put a moderate amount of thought into the question); 3=excellent (it’s clear that you read the paper carefully and put a lot of effort into reflecting on the reading and formulating a question).

The objectives of these required "daily questions" are:

- to provide critical thinking practice
- to give us feedback on your level of understanding of course material
- to help move classroom focus to issues you find interesting and important

What types of questions make good questions for discussion?

A question should indicate some depth of thought, and not just be, "why did the author want to study ABC?" A question could be something you don't understand (e.g., “how do smart grid cybersecurity risks affect different types of energy consumers?”), “under cap-and-trade policies how are greenhouse gas emissions measured and how are caps enforced?”), or that seems to contradict something else we've heard (e.g., "how can we reconcile these results with those of Sarah Smith who found opposite results in her analysis?") or something that was not clarified by the paper in question. Comments could for instance, indicate what you think is a novel approach by the author; highlight an important, but underemphasized point; make a linkage with another paper we read previously, etc. Or perhaps you might disagree with the data, methods, and interpretation of data, interpretation of results, conclusions, speculation, or extrapolation.

**Hot Topic presentation:** Each student will present a 4-5 minute presentation on latest trends on energy and environmental issues – on things that are happening now, that are interesting and beyond the scope of class structure. Each student will choose a date and present on that day. There will be around two (or more) presentations each day. Students will be graded on the presentation style, timing and topic.

**Problem Sets:** The three problem sets will cover quantitative and qualitative material covered in the class. You will be asked to calculate basic ‘back of the envelope’ information on a variety of different subjects as well as provide qualitative synthesis of the different articles and speakers coming to the class. You are encouraged to do individual work supported within a larger study group (i.e. do your own work, but use the other course members as resources for help and support) and to discuss the problems and your analyses with your fellow students.

The quantitative questions will be evaluated on your thinking process (outlining your problem, stating your assumptions, showing your work, explaining your thinking process as clearly as possible) as well as the answer obtained. In some cases, there will be a ‘correct’ response, in others, the value of the problem is your thinking process and the underlying logic of the assumptions that you made while solving the problem. Underlying message: *think*. For the qualitative questions, they aim to examine your
comprehension and assimilation of course readings and material. These will be graded on a 5-point scale, with a 5 denoting a well researched and supported response, 4 a response with most of the logic correct, but with up to two errors in logic or calculation, and a 3 for problems with more than two errors in logic or calculation, but still an overall grasp of some basic concept, and a 0 for problems not set up or calculated correctly. Use references and draw from the readings.

**Final presentation, policy brief and video investigation project:** During the last section of the course, students will develop presentations with their groups on some issue related to energy and environmental policy. Groups should work together to come up with a topic that explores in greater detail and in more depth an issue raised in class or one related to the course content that was not covered in class. The purpose of this assignment is for you to get the opportunity to explore some issue in greater depth than we have time to cover in lectures and teach your peers and instructors about it. Examples of possible topics include: “Evaluation of Carbon Offset Programs”, “Review/critique of laws and legislation in Minnesota related to renewable energy”, “Review of status of global fisheries”, “Evaluation of ‘eating local’ culture on energy use”, or many others of your choice. Each team will be responsible for one class period with its presentation and video and presentation of its policy brief, but the team can decide how to divide that time between lecture and discussion of relevant articles. Be creative! You will have the opportunity to evaluate the participation of your group members for their final grades.

The **Video Investigation Group Project** is a combination of policy analysis, calculation and presentation skills will require your group (3-4 students) to prepare a class lecture length video and presentation, and 3-5 page policy brief on an assigned topic. The background and supporting evidence will use the tools you are taught in class. You will be divided into teams that will research and analyze an assigned energy/environmental issue. You are responsible for ensuring that these groups function smoothly, guidelines are provided in the video investigation project materials.

Your group will be responsible for developing the quantitative and qualitative analysis, defining an interesting and relevant angle and evaluation of applicable policies (in consultation with experts in the field, and other universities, the peer-reviewed literature, through other courses, state and private consultations, etc…), data collection, choosing and carrying out the quantitative and policy analyses to write, plan, film, edit and present the final video and policy brief. These will then be posted on the class Facebook site.

The goal of this project is to help your group prepare to communicate complex energy and environmental policy issues to an educated population and provide a supporting policy brief, supported by relevant policy analysis of difficult, yet pertinent questions. In doing so, I hope you reach a more nuanced understanding of the policy tradeoffs. Grading for the group project will be assessed on both an individual and collective basis. The video investigation product (30% of grade – 15% video and 15% presentation) and accompanying policy briefing (10% of grade). The grading of the elements of the video investigation project are on the project website and will be presented by Kate Connors. **Additional information** at: [http://www.fourthcanyon.com/VIP/VIP.swf](http://www.fourthcanyon.com/VIP/VIP.swf)
In terms of class participation, we expect each student to come to class having read the day’s reading and responded to the posted questions on the Moodle Site at noon the day before class. The format of the class will be a hybrid. While some lectures remain, the class will mainly be taught as a “flipped class”, where do the readings and answer questions BEFORE class, we use the class time to resolve complex issues and delve deeper into the material. Also, we will be posting on the class Facebook Page: Energy and Environmental Policy (https://www.facebook.com/EnergyandEnvironmentalPolicy). Everyone should post an energy or environmental related story once a week. Feel free to post comments on other stories as well.

We will follow all university guidelines regarding disabilities and Academic Integrity. If you have a disability, please see Disability Services so that we can make the necessary accommodations. http://ds.umn.edu/student-services.html. The University is committed to providing quality education to all students regardless of ability. Determining appropriate disability accommodations is a collaborative process. You as a student must register with Disability Services and provide documentation of your disability. The course instructor must provide information regarding a course's content, methods, and essential components. The combination of this information will be used by Disability Services to determine appropriate accommodations for a particular student in a particular course.

Academic Integrity: You are expected to do your own academic work and cite sources as necessary. Failing to do so is scholastic dishonesty. Scholastic dishonesty means plagiarizing; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; altering, forging, or misusing a University academic record; or fabricating or falsifying data, research procedures, or data analysis. (Student Conduct Code: http://www1.umn.edu/regents/policies/academic/Student_Conduct_Code.html) If it is determined that a student has cheated, he or she may be given an "F" or an "N" for the course, and may face additional sanctions from the University. For additional information, please see: http://policy.umn.edu/Policies/Education/Education/INSTRUCTORRESP.html. If you have any questions about plagiarism, please see http://www.youtube.com/watch?v=Mwbw9KF-ACY&feature=player_embedded.

In order to avoid all possible bias, we ask you to **PLEASE turn in your assignments with your student numbers ONLY**. Assignments turned in **late** will lose three points for every day after the due **Date**.

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Due Date</th>
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<tbody>
<tr>
<td>Hot topic presentation</td>
<td>Every day (September to October)</td>
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<tr>
<td>Problem set 1</td>
<td>September 23</td>
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<tr>
<td>Problem set 2</td>
<td>October 14</td>
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<tr>
<td>Video project draft, interview footage completed and review</td>
<td>October 25</td>
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<tr>
<td>Problem set 3</td>
<td>October 28</td>
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<tr>
<td>Policy brief due</td>
<td>November 25</td>
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<tr>
<td>Final presentations and videos</td>
<td>Dec 3- Dec 16</td>
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**Student Conduct Code:** The University seeks an environment that promotes academic achievement and integrity that is protective of free inquiry and that serves the educational mission of the University. Similarly, the University seeks a community that is free from violence, threats, and intimidation; that is respectful of the rights, opportunities, and welfare of students, faculty, staff, and guests of the University; and that does not threaten the physical or mental health or safety of members of the University community. To review the Student Conduct Code, please see: http://www1.umn.edu/regents/policies/academic/Student_Conduct_Code.html.

**Use of Personal Electronic Devices in the Classroom:** Using personal electronic devices in the classroom setting can hinder instruction and learning, not only for the student using the device but also for other students in the class. To this end, the University establishes the right of each faculty member to determine if and how personal electronic devices are allowed to be used in the classroom. For complete information, please reference: http://policy.umn.edu/Policies/Education/Education/CLASSROOMPED.html.

**Appropriate Student Use of Class Notes and Course Materials:** Taking notes is a means of recording information but more importantly of personally absorbing and integrating the educational experience. However, broadly disseminating class notes beyond the classroom community or accepting compensation for taking and distributing classroom notes undermines instructor interests in their intellectual work product while not substantially furthering instructor and student interests in effective learning. Such actions violate shared norms and standards of the academic community. For additional information, please see: http://policy.umn.edu/Policies/Education/Education/CLASSNOTESSTUDENTS.html.

**Student Mental Health and Stress Management:** As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily
activities. University of Minnesota services are available to assist you with addressing these and other concerns you may be experiencing. You can learn more about the broad range of confidential mental health services available on campus via http://www.mentalhealth.umn.edu/.

**Equity, Diversity, Equal Opportunity, and Affirmative Action:**
The University will provide equal access to and opportunity in its programs and facilities, without regard to race, color, creed, religion, national origin, gender, age, marital status, disability, public assistance status, veteran status, sexual orientation, gender identity, or gender expression. For more information, please consult Board of Regents Policy: http://www1.umn.edu/regents/policies/administrative/Equity_Diversity_EO_AA.html.

**Academic Freedom and Responsibility:** Academic freedom is a cornerstone of the University. Within the scope and content of the course as defined by the instructor, it includes the freedom to discuss relevant matters in the classroom. Along with this freedom comes responsibility. Students are encouraged to develop the capacity for critical judgment and to engage in a sustained and independent search for truth. Students are free to take reasoned exception to the views offered in any course of study and to reserve judgment about matters of opinion, but they are responsible for learning the content of any course of study for which they are enrolled.* Reports of concerns about academic freedom are taken seriously, and there are individuals and offices available for help. Contact the instructor, the Department Chair, your adviser, the associate dean of the college, or the Vice Provost for Faculty and Academic Affairs in the Office of the Provost.
Class structure
Intro (Sept 9 -21)
1. Introduction
2. Methods and Context
   a. Methods for Madness I
   b. Methods for Madness II
   c. The Context
Climate (Sept 23 – October 5)
1. Climate - Climate Change and Policy
2. Climate - Economics and Policy Making
   a. Economics for environmental policy: Wedges, Cost Economics
   b. Making Environmental and Energy Policy
3. Climate - Environmental Policy, Pollution and Sustainability
Transportation – (Oct 7 – Oct 19)
4. Transportation Sector
   a. Fossil fuel I
   b. Fossil fuel II
5. Transportation Sector – Transport and pollution
Electricity (Nov 2 – Nov 16)
6. Electricity I - Basics
7. Electricity II - Wind and solar Utility re-structure and smart grid
8. Electricity Markets - Basic economics and introduction to electricity markets
9. Electricity III - Pollution from electric sector and CCS
Energy and development (Nov 18 – Nov 23)
11. Energy and Development II – Focus on China
Other topics/classes (Sept 9 -Dec 16)
12. Student Video Investigation Projects, Hot topic and other presentations and wrap-up
13. Evaluation and Speed-Wedge
Week 1

Date: Wednesday September 9
Title: Introduction

Class Agenda:
- Overview of syllabus
- Davies et al. 2014, Chapter 1
- How to do the Homework Assignments
- Intro to hot topic presentations
- Hand out Problem set 1
- Group Mingle Activity

Supplemental Readings:

Week 2

Date: Monday September 14
Title: Methods for the Madness I

Class Agenda:
- Meet with librarian Mary Schoenborn @Wilson LIBRARY S30B for discussing about library resources for Energy and Environmental Policy

Reading resources:

Date: Wednesday September 16
Title: The Context - Methods for the Madness II

Class Agenda:
- Meet with Kate Connors and Scott Spicer on the Video Investigation Project and readings for Climate Change and Policy I
- Meet with Carver County staff to discuss potential student projects

Reading resources:
- http://www.fourthcanyon.com/VIP/VIP.swf
- Climate Central, Global Weirdness, pages 1-63, pages 197-200

Additional notes: Review past videos, available on Library and Facebook Websites
Week 3

Date: Monday September 21
Title: The Context
Class Agenda:
- Hot topic presentation
- Discussion on readings
- Hand out problem set 2

Reading resources:
- Groups and Topics Decided

Date: Wednesday September 23
Title: Climate Change and Policy
Class Agenda:
- Hot topic presentation
- Discussion on readings

Reading resources:

Supplemental Readings:
- Review Rubin Chapter 12

Additional notes: Problem set 1 due in class

Week 4

Date: Monday September 28
Title: Climate - Economics for environmental policy: Wedges, Cost Economics
Class Agenda:
- Hot topic presentation
- Discussion on readings

Reading resources:
- Davies Chapter 2: Economic Rationale section (scanned copy uploaded)
- OTA, 1993, Industrial Energy Efficiency, page 123, box B4

Date: Wednesday September 30  
Title: Climate - Making Environmental and Energy Policy  
Class Agenda:  
• Hot topic presentation  
• Discussion on readings  
• Ideas for GROUP Presentation/Video/Brief Vetted

Reading resources:  

Week 5  
Date: Monday October 5  
Title: Climate - Environmental policy, pollution and sustainability  
Class Agenda:  
• Hot topic presentation  
• Discussion on readings

Reading resources:  

Supplemental Reading:  
• Kraft, Michael E., and Norman Vig.2010, Conclusion and appendices. In Environmental Policy: New Directions for the Twenty-first Century, 7th
Date: Wednesday October 7  
Title: Transportation sector - Fossil Fuels I: Oil, Coal and Natural Gas  
Class Agenda:  
- Hot topic presentation  
- Discussion on readings  
Reading resources:  
- All: Davies et al, Chapter 2, Chapter 3 sections on Fossil Fuels, Chap 7 on Oil, Coal and NG transportation (scanned copy uploaded)  
- Half of class: Oil  
Supplemental Reading:  
- Look at: http://www.eia.doe.gov/emeu/international/petroleum.html

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Week 6  
Date: Monday October 12  
Title: Fossil Fuels II: Clean power plan  
Class Agenda:  
- Hot topic presentation  
- Debate taking different sides  
Reading resources:  
- Nicolas Loris (July 2015) The Many Problems of the EPA’s Clean Power Plan and Climate Regulations: A Primer,
http://www.heritage.org/research/reports/2015/07/the-many-problems-of-the-
epas-clean-power-plan-and-climate-regulations-a-primer

  Decarbonizing America’s Energy System
  https://www.americanprogress.org/issues/green/news/2015/04/15/111188/the-
clean-power-plan-a-critical-step-toward-decarbonizing-americas-energy-system/

**Supplemental Reading:**
- Chikkatur et al. 2011, Coal Power Impacts, Technology and Policy: Connecting the Dots, Annual Review of Environment and Resources,
- Economist, 2012, Natural Gas Reserves,
  http://www.economist.com/blogs/graphicdetail/2012/06/focus
  doi:10.1016/j.enpol.2011.05.020

**Date:** Wednesday October 14
**Title:** Expert opinion – Nick Mark from CPE
**Class Agenda:**
- Discussion with invited speaker
**Reading resources:** TBD
**Additional notes:** Problem set 2 due in class

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**Week 7**
**Date:** Monday October 19
**Title:** Transportation sector - Transport and pollution
**Class Agenda:**
- Hot topic presentation
- Discussion on readings
**Reading resources:**
- Davies et al Chapter 7 on transportation
- Greene, David L. and Plotkin Steven. 2011 Reducing GHG from US Transportation, Pew Center on Global Climate Change,
  http://www.pewclimate.org/publications/reducing-ghg-emissions-from-transportation

**Date:** Monday October 21
**Title:** Transportation Sector: Pollution and Management and Electric Vehicles
**Class Agenda:**
- Hot topic presentation
Discussion on readings

Reading resources:
- Davies et al.: Chapter 9 on Electrifying Transportation

Supplemental Reading:
- Hill J, Nelson E, Tilman D, Polasky S, Tiffany D, 2006, "From the Cover: Environmental, economic, and energetic costs and benefits of biodiesel and ethanol biofuels" Proceedings of the National Academy of Sciences 103(30): 11206


Davies et al. 2014 Chapter 4 on the Electric System (scanned copy uploaded)


Supplemental Reading:


**Additional notes:** Problem set 3 due on class

**Date:** Wednesday Nov 4  
**Title:** Electricity II (Wind and solar Utility re-structure and smart grid)  
**Class Agenda:**  
- Discussion on readings  

**Reading resources:**  
- Skim: Davies et al. Chapter 4 on ratemaking and Chapter 7 on electricity transmission (scanned copy uploaded)  

**Supplemental Reading:**  
- Review Davies et al. Chapter 2 and 3 sections on non-fossil resources  
Week 10

Date: Monday Nov 9
Title: Electricity Markets (Basic economics and introduction to electricity markets)
Class Agenda:
• Discussion on readings

Reading resources:

Supplemental Reading:

Additional Readings:
• Marris, E. 2008 Upgrading the Grid, Nature, 454 (7204), 31 July 2008 572-573
• A greener grid, Nature, 454(7204), 31 July 2008, 551-552

Date: Wednesday November 11
Title: Expert opinion – Aditya/Ling from MISO
Class Agenda:
• Discussion with invited speaker
Reading resources: TBD

Week 11

Date: Monday November 16
Title: Electricity III - Nuclear power and CCS
Class Agenda:
• Discussion on readings

Reading resources:
Supplemental Reading:

Date: Wednesday November 18
Title: Energy and Development I (Energy Poverty)
Class Agenda:
- Discussion on readings
Reading resources:
- Energy Poverty
  - Ambuj D. Sagar (Jul 2005) Alleviating energy poverty for the world's poor http://dx.doi.org/10.1016/j.enpol.2004.01.001
- Nepal – energy situation

Supplemental Reading:
- Watch Hans Rosling on Health and Wealth and Development, www.youtube.com/watch?v=meR5Z1UAswY

Week 12
Date: Monday November 23:
Title: Energy and Development II: Focus on China
Class Agenda:
- Discussion on readings
Reading resources:
Additional Readings:

**Date: Wednesday November 25**
**Title:** Expert Opinion – Julia Eagles and Benjamin Stafford
**Class Agenda:**
- Discussion with invited speaker
**Reading resources:** N/A

**Week 13**
**Date:** Monday November 30
**Title:** Presentation
**Class Agenda:** Presentation #1
**Reading resources:** N/A
**Additional notes:** Policy brief due on class

**Date: Wednesday December 2**
**Title:** Presentation
**Class Agenda:** Presentation #2
**Reading resources:** N/A

**Week 14**
**Date:** Monday December 7
**Title:** Presentation
**Class Agenda:** Presentation #3
**Reading resources:** N/A

**Date:** Wednesday December 9
**Title:** Presentation
**Class Agenda:** Presentation #4
**Reading resources:** N/A

**Week 15**
**Date:** Monday December 14
**Title:** Presentation and talk
**Class Agenda:**
Presentation #5
Listen to talk on “Can energy use data reduce electricity costs and environmental impacts?” organized by IoNE frontiers 12:00-13:30 @HHH

Reading resources:

Date: Wednesday December 16
Title: Last day of class

Class Agenda:
- Speed Wedge
- Wrap-up and evaluations
- Have a wonderful break!

Reading resources: N/A